

NEUROPSYCHOLOGICAL ASSESSMENT OF TEMPORAL PERCEPTION

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Abstract

Deficits in temporal perception were previously described in certain diseases, such as Parkinson's disease. On the other hand, different methods have been used to assess temporal perception, both in healthy subjects and patients. However, there are no validated cognitive tests to measure this function and we face the problem of lacking a gold-standard. Evidence from literature suggests that prospective and retrospective measurements of time estimation depend on different cognitive processes. Current models postulate the existence of an internal clock for processing temporal information. *Objectives:* to develop and validate a neuropsychological test to assess temporal perception and to study temporal perception along normal ageing. *Methods and Material:* 86 healthy volunteers, aged 15-90 yrs-old, without major depression, dementia (MMSE), neurological or psychiatry diseases and not taking drugs with central nervous system effect were included. Subjects were prospectively asked to verbally estimate and produce empty time intervals signalled by auditory beeps. Intervals durations were of 7, 32 and 58 seconds, each interval repeated three times in a pseudo-random fashion, so that nine trials were performed. Two tests, accepted to replicate daily life measurement of time perception were used as "gold-standards": estimation of duration to draw a clock ("clock time") and estimation of duration of global current neuropsychological evaluation ("global time"); in these two tasks subjects were not aware they would be asked to estimate those durations (retrospective estimations). Sub-

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jects also performed a classical digit span forward (DSF) and digit span reverse (DSR). *Results:* for each subject we calculated the ratio between estimated or produced time over target time, and the ratio between clock or global time and objective time. Median value for estimation was slightly above 1 and for production was slightly below one. We found a negative correlation between estimation and production; a correlation between both estimation and production and global time; a negative correlation between age and digit span; a positive correlation between estimation and age and a negative correlation between production and age; a negative correlation between estimation and digit span and a positive correlation between production and digit span. We considered three age groups (1 5-40 yrs-old; 41-64 yrs-old; 65-90 yrs-old): a trend was found in estimation, production, and global time toward a faster internal clock with older age, the difference reaching significance between extremes age groups in estimation and production tasks. *Conclusions:* tests were easy to perform; a correlation was found between estimation and production and one of the "gold-standards"; we demonstrated a clear age effect of age on digit span and a trend of age effect on estimation and production, indicating an acceleration of internal clock with older age, in contrast to previous studies. Correlation between estimation, production and digit span adds further evidence for a role of attention and working memory in prospective timing.